1652

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RAW SEQUENCE LISTING
PATENT APPLICATION: US/10/671,207

DATE: 01/21/2004
TIME: 12:30:57

Input Set : N:\Crf3\RULE60\10671207.RAW.txt
Output Set: N:\CRF4\01212004\J671207.raw

<110> APPLICANT: O'Donnell, Michael E.
Yuzhakov, Alexander
Yurieva, Olga
Jeruzalmi, David
Bruck, Irina
Kuriyan, John
<120> TITLE OF INVENTION: ENZYMES DERIVED FROM THERMOPHILIC ORGANISMS THAT FUNCTION AS A CHROMOSOMAL REPLICASE, PREPARATION AND USE THEREOF
<130> FILE REFERENCE: 22221/1030
<140> CURRENT APPLICATION NUMBER: 10/671,207
<141> CURRENT FILING DATE: 2003-09-25
<150> PRIOR APPLICATION NUMBER: US/09/716,964
<151> PRIOR FILING DATE: 2000-11-21
<150> PRIOR APPLICATION NUMBER: 60/143,202
<151> PRIOR FILING DATE: 1997-04-08
<150> PRIOR APPLICATION NUMBER: 08/823,407
<151> PRIOR FILING DATE: 1997-04-08
<150> PRIOR APPLICATION NUMBER: 09/057,416
<151> PRIOR FILING DATE: 1998-04-08
<160> NUMBER OF SEQ ID NOS: 212
<170> SOFTWARE: PatentIn Ver. 2.1
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<211> LENGTH: 2007
<212> TYPE: DNA
<213> ORGANISM: Thermus thermophilus
<400> SEQUENCE: 1
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actagccttg tgagcgccct ctaccgccgc ttccgccccc tcaccttcca ggaggtggtg 180
gggcaggagc acgtgaagga gcccctcctc aaggccatcc gggaggggag gctcgcccag 240
gcctacctct tctccgggcc caggggcgtg ggcaagacca ccacggcgag gctcctcgcc 300
atggcggtgg ggtgccaggg ggaagacccc ccttgcgggg tctgccccca ctgccaggcg 360
gtgcagaggg gcgcccaccc ggacgtggtg gacattgacg ccgccagcaa caactccgtg 420
gaggacgtgc gggagctgag ggaaaggatc cacctcgccc ccctctctgc ccccaggaag 480
gtcttcatcc tggacgaggc ccacatgctc tccaaaagcg ccttcaacgc cctcctcaag 540
accctggagg agccccccgcc ccacgtcctc ttcgtcttcg ccaccaccga gcccgagagg 600
atgccccccca ccatcctctc ccgcacccag cacttccgct tccgccgcct cacggaggag 660
gagatcgcct ttaagctccg gcgcatcctg gaggccgtgg ggcgggaggc ggaggaggag 720
gccctcctcc tcctcgcccg cctggcggac ggggccctta gggacgcgga aagcctcctg 780
gagcgcttcc tcctcctgga aggcccccctc acccggaagg aggtggagcg cgccctaggc 840
tccccccccag ggaccggggt ggccgagatc gccgcctccc tcgcgagggg gaaaacggcg 900
gaggccctgg gcctcgcccg gcgcctctac ggggaagggt acgccccgag gagcctggtc 960

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gagcgcctcg cccgccgctc cgacgcctta agcctggagg tggccctcct ggaggcggga 1140
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cccaagccgg aaagcccccc gaccccggaa cccccaaggc ccgaggaggc gcccgacctg 1260
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ttccactacc gcaaggcctc ggaacagaag gtgaggctcc tccccctggc ccaggcccat 1440
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ccccgcccgg ccccacctcc tgaagcgccc gcacccccgg gccctcccga ggaggaggta 1560
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cccctgagcc aagacgagat agggggtact ggtatataat gggggcatga cgcggaccac 1740
cgacctcgga caagagaccg tggacaacat cctcaagcgc ctccgccgta ttgagggcca 1800
ggtgcggggg ctccagaaga tggtggccga gggccgcccc tgcgacgagg tcctcaccca 1860
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<210> SEQ ID NO: 2
<211> LENGTH: 529
<212> TYPE: PRT
<213> ORGANISM: Thermus thermophilus
<400> SEQUENCE: 2

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Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
             20                  25                  30
Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
         35                  40                  45
Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
     50                  55                  60
Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg
 65                  70                  75                  80
Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser
                 85                  90                  95
Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu
            100                 105                 110
Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser
        115                 120                 125
Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro
    130                 135                 140
His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro
145                 150                 155                 160
Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu
                165                 170                 175
Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg
            180                 185                 190
Glu Ala Glu Glu Glu Ala Leu Leu Leu Leu Ala Arg Leu Ala Asp Gly
        195                 200                 205
```

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Input Set : N:\Crf3\RULE60\10671207.RAW.txt
Output Set: N:\CRF4\01212004\J671207.raw

```
95       Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu
96           210                 215                 220
97       Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro
98       225                 230                 235                 240
99       Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr
100                      245                 250                 255
101       Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala
102                  260                 265                 270
103       Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu
104              275                 280                 285
105       Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln
106          290                 295                 300
107       Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu
108       305                 310                 315                 320
109       Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala
110                      325                 330                 335
111       Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro
112                  340                 345                 350
113       Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro
114              355                 360                 365
115       Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe
116          370                 375                 380
117       Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg
118       385                 390                 395                 400
119       Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys
120                      405                 410                 415
121       Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro
122                  420                 425                 430
123       Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu
124              435                 440                 445
125       Gly Glu Lys Lys Ser Leu Ser Pro Arg Pro Arg Pro Ala Pro Pro Pro
126          450                 455                 460
127       Glu Ala Pro Ala Pro Pro Gly Pro Pro Glu Glu Glu Val Glu Ala Glu
128       465                 470                 475                 480
129       Glu Ala Ala Glu Glu Ala Pro Glu Glu Ala Leu Arg Arg Val Val Arg
130                      485                 490                 495
131       Leu Leu Gly Gly Arg Val Leu Trp Val Arg Arg Pro Arg Thr Arg Glu
132                  500                 505                 510
133       Ala Pro Glu Glu Glu Pro Leu Ser Gln Asp Glu Ile Gly Gly Thr Gly
134              515                 520                 525
135       Ile
137 <210> SEQ ID NO: 3
138 <211> LENGTH: 1590
139 <212> TYPE: DNA
140 <213> ORGANISM: Thermus thermophilus
141 <400> SEQUENCE: 3
142       gtgagcgccc tctaccgccg cttccgcccc ctcaccttcc aggaggtggt ggggcaggag 60
143       cacgtgaagg agcccctcct caaggccatc cgggagggga ggctcgccca ggcctacctc 120
144       ttctccgggc ccaggggcgt gggcaagacc accacggcga ggctcctcgc catggcggtg 180
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RAW SEQUENCE LISTING DATE: 01/21/2004
PATENT APPLICATION: US/10/671,207 TIME: 12:30:57

Input Set : N:\Crf3\RULE60\10671207.RAW.txt
Output Set: N:\CRF4\01212004\J671207.raw

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cgggagctga gggaaaggat ccacctcgcc cccctctctg cccccaggaa ggtcttcatc 360
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tttaagctcc ggcgcatcct ggaggccgtg gggcgggagg cggaggagga ggccctcctc 600
ctcctcgccc gcctggcgga cggggccctt agggacgcgg aaagcctcct ggagcgcttc 660
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gggaccgggg tggccgagat cgccgcctcc ctcgcgaggg ggaaaacggc ggaggccctg 780
ggcctcgccc ggcgcctcta cggggaaggg tacgccccga ggagcctggt ctcgggcctt 840
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gcccgccgct ccgacgcctt aagcctggag gtggccctcc tggaggcggg aagggccctg 1020
gccgccgagg ccctacccca gcccacgggc gctccttccc cagaggtcgg ccccaagccg 1080
gaaagccccc cgaccccgga acccccaagg cccgaggagg cgcccgacct gcgggagcgg 1140
tggcgggcct tcctcgaggc cctcaggccc accctacggg ccttcgtgcg ggaggcccgc 1200
ccggaggtcc gggaaggcca gctctgcctc gctttccccg aggacaaggc cttccactac 1260
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gaggaggtcg tcctcgtcct ggagggagaa aaaaaaagcc tgagcccaag gccccgcccg 1380
gccccacctc ctgaagcgcc cgcacccccg ggccctcccg aggaggaggt agaggcggag 1440
gaagcggcgg aggaggcccc ggaggaggcc ttgaggcggg tggtccgcct cctgggggggg 1500
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caagacgaga taggggtac tggtatataa 1590

<210> SEQ ID NO: 4
<211> LENGTH: 464
<212> TYPE: PRT
<213> ORGANISM: Thermus thermophilus
<400> SEQUENCE: 4

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20 25 30
Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
35 40 45
Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
50 55 60
Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg
65 70 75 80
Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser
85 90 95
Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu
100 105 110
Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser
115 120 125
Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro
130 135 140
His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro
145 150 155 160

RAW SEQUENCE LISTING DATE: 01/21/2004
PATENT APPLICATION: US/10/671,207 TIME: 12:30:57

Input Set : N:\Crf3\RULE60\10671207.RAW.txt
Output Set: N:\CRF4\01212004\J671207.raw

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195       Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu
196                       165                 170                 175
197       Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg
198                   180                 185                 190
199       Glu Ala Glu Glu Glu Ala Leu Leu Leu Leu Ala Arg Leu Ala Asp Gly
200               195                 200                 205
201       Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu
202           210                 215                 220
203       Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro
204       225                 230                 235                 240
205       Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr
206                       245                 250                 255
207       Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala
208                   260                 265                 270
209       Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu
210               275                 280                 285
211       Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln
212           290                 295                 300
213       Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu
214       305                 310                 315                 320
215       Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala
216                       325                 330                 335
217       Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro
218                   340                 345                 350
219       Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro
220               355                 360                 365
221       Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe
222           370                 375                 380
223       Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg
224       385                 390                 395                 400
225       Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys
226                       405                 410                 415
227       Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro
228                   420                 425                 430
229       Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu
230               435                 440                 445
231       Gly Glu Lys Lys Lys Pro Glu Pro Lys Ala Pro Pro Gly Pro Thr Ser
232           450                 455                 460
234 <210> SEQ ID NO: 5
235 <211> LENGTH: 454
236 <212> TYPE: PRT
237 <213> ORGANISM: Thermus thermophilus
238 <400> SEQUENCE: 5
239       Met Ser Ala Leu Tyr Arg Arg Phe Arg Pro Leu Thr Phe Gln Glu Val
240         1               5                  10                  15
241       Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
242                    20                  25                  30
243       Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
244                35                  40                  45
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RAW SEQUENCE LISTING ERROR SUMMARY DATE: 01/21/2004
PATENT APPLICATION: US/10/671,207 TIME: 12:30:58

Input Set : N:\Crf3\RULE60\10671207.RAW.txt
Output Set: N:\CRF4\01212004\J671207.raw

Please Note:
Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

Seq#:17; Xaa Pos. 2,3,5
Seq#:29; N Pos. 6,12,21
Seq#:30; N Pos. 7,10,19,22
Seq#:42; N Pos. 7,8,13,14
Seq#:43; N Pos. 8,9,17,18
Seq#:66; Xaa Pos. 3,5
Seq#:67; Xaa Pos. 4,7
Seq#:68; Xaa Pos. 3,5
Seq#:89; Xaa Pos. 79
Seq#:91; Xaa Pos. 47,57

VERIFICATION SUMMARY DATE: 01/21/2004
PATENT APPLICATION: US/10/671,207 TIME: 12:30:58

Input Set : N:\Crf3\RULE60\10671207.RAW.txt
Output Set: N:\CRF4\01212004\J671207.raw

L:405 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:408 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:17
L:411 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:17
L:414 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:17
L:415 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:17 after pos.:0
L:769 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:772 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:29
L:775 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:29
L:778 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:29
L:779 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:29 after pos.:0
L:787 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:790 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:30
L:793 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:30
L:796 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:30
L:799 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:30
L:800 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:30 after pos.:0
L:907 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:910 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:42
L:913 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:42
L:916 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:42
L:919 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:42
L:920 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:42 after pos.:0
L:928 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:931 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:43
L:934 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:43
L:937 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:43
L:940 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:43
L:941 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:43 after pos.:0
L:1141 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:1144 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:66
L:1147 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:66
L:1148 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:66 after pos.:0
L:1157 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:1160 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:67
L:1163 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:67
L:1164 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:67 after pos.:0
L:1173 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:1176 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:68
L:1179 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:68
L:1180 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:68 after pos.:0
L:1650 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:89 after pos.:64
L:1710 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:91
L:1715 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:91 after pos.:32
M:341 Repeated in SeqNo=91
L:5640 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!
L:5643 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:193
L:5646 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:193